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Role of Information and Communication Technologies on the War against Terrorism and on the Development of Tourism: Evidence from a Panel of 28 Countries

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Abstract

This study aims to examine the dynamic relationships among information and communication technologies (ICTs), international tourism, and terrorism in 28 countries from 1998 to 2016. Three weighted indices were constructed to gather the following factors: i) "war against terrorism" by military factors, ii) ICTs by different communication technologies, and iii) tourism demand by tourism factors. Results confirmed that the potential determinants of the war against terrorism include computer and communication services, secure Internet servers, per capita income, and trade openness. The key factors of ICT development are armed forces personnel, arms imports, military expenditures, per capita income, and trade openness, which can be effectively utilized for the war on terrorism across countries. Per capita income, trade, foreign direct investment inflows, and military expenditures substantially increased inbound tourism, whereas tourism demand increased computer and communication services, Internet users, and trade openness. Results also showed that armed forces personnel, arms imports, and growth-specific factors substantially increased tourism receipts, whereas high military expenditures decreased tourism income. These findings offer useful policy implications. One key conclusion drawn from this study is that ICTs play a potentially vital role in supporting the war against terrorism and the development of tourism across countries.

Keywords: ICTs; International tourism; War against terrorism; Military expenditures; Arms imports.

1. Introduction

The world has witnessed a frightening exponential increase in terrorist attacks. The Global Terrorism Database (GTD) suggests that there have been at least 8,441 terrorist attacks worldwide with 15,396terrorism-related casualties. This is a grim situation that has to be mitigated by sound economic policies (LaFree and Dugan, 2007). In addition to the staggering human toll, terrorism also slows down a country's development and negatively affects tourism-related businesses, foreign investments, and stock market prices (Mueller and Stewart, 2014). The September 11US terrorist attacks resulted in approximatelyUSD200 billion of cumulative losses. The global war on terrorism has an estimated cost of USD 3.3 trillion, which is equal to 27% of the world GDP (Carter and Cox, 2011; Trotta, 2013).The key drivers of terrorism are often rooted in pursuing religious agendas (e.g., al-Qaeda and Taliban) or attaining perilous political goals. Manipulating the hearts and minds of people is one of the most effective methods that terrorists use to achieve their goals. International media often portray dramatic accounts of terrorist attacks (e.g., the progressing media buildup around terrorist attacks by an organization called Boko Haram, which is active in Nigeria). Similar accounts of horrific terrorist attacks have also been reported in Pakistan, Yemen, and the Congo. Approximately 5,000 civilians were killed by Boko Haram from 2007 to 2012, androughly10,116 people were killed in Pakistan during the same period. Furthermore, the GTD indicates that Somalia has an index value of 6.944(Blanchard, 2014; Campbell, 2014).

Terrorism is widely defined as the capability of the media to galvanize the spread of news related to terrorism attacks worldwide. Krueger and Maleckova (2003) argued that terrorism is a planned activity that aims to affect a group of people with fear and dread instead of directly

causing damage. Campos and Gassebner (2013) concluded that the media may be the smartest way to promote terrorist agendas because terrorists usually aim to instill fear among people. The policies of counterterrorism departments are often defensive in nature. The main facets of the direct-action approach to terrorism involve dismantling terrorist training campuses, retaliating against a state sponsor, gathering intelligence, and freezing the bank accounts of terrorist. The defensive approach often relies on preemptive measures, such as enhancing border security and enacting technological barriers, including bomb and metal detectors (Arce and Sandler, 2005). Several policies adopted by counter terrorism departments ostensibly lean toward the direct-action approach. Counter terrorism endeavors should critically address the root cause of terrorism, with a specific end goal of anticipating terroristic acts before it happens. The number of alternatives taken depends on human, financial, and political assets, which the United States has contributed to the agenda. The policies are adopted to determine the underlying causes of terrorism, which usually occurs owing to deficient resources. The objective of the current study is to identify the terrorism factors and which factors drive terrorism and oppression while taking into account the end goal of improving asset allocation to shape a superior counter terrorism strategy.

Tourism is frequently characterized in view of the motivation behind utilizing statistical, legislative, or industrial studies. An anomaly also emerges regarding whether tourism is in fact an industry or an area. This, in itself, is a factual issue because efforts are made to measure the commitment made by numerous tourists that add to tourism instead of elements that provide the food and other requirements of visitors (e.g., travel offices, convenience). Putting aside these philosophical issues, specialists have embraced tourism definitions in light of factual and specialized limits (Netto, 2009).Tourism for the sole purpose of business is considered a premature adopter of innovation (Flouri and Buhalis, 2004). The elements influencing technological reception by tourists are different from those of business travelers, which have a different inspiration for traveling (Middleton et al., 2009).Worldwide tourism receipts increased by 4% in 2012, i.e., the money expended by travelers increasedtoUSD1,075 billion. This amounts to a 4% increase in tourism entries over the earlier year, which were atUSD1,035 million in2011. Furthermore, an additionalUSD219 billion was recorded in receipts from international tourists' arrival and transport, and the total exports produced by worldwide tourism in 2012amountedto USD1.3 trillion (WTO, 2013).Travel and tourism indicate monetary accomplishment, but this does not shield it from the evil vitality of terrorism. Furthermore, natural and manmade tragedies influence the upsurge of tourism. The risk of terrorism tends to undermine potential tourism revenues significantly, and fear of terrorist aggression and animosity is considered the norm today. However, experts indicate that these started in the September 11 US terrorist attacks. Terrorism and tourism composing has a couple of terrorist attacks point of views in concentrating on vacationers or the businesses, and the effects of fear-mongering on tourism requires corresponding responses from the tourism industry. Terrorism as a type of political articulation dates back to 6A.D., when Jewish revolutionaries (also known as Zealots) restricted Romans from settling in Palestine and began a terroristic militant fight to force the Romans out of Palestine (Poland, 1988; Schlagheck, 1988).

The World Tourism Organization stated that tourist arrival in 2010 was approximately 940 million, which is roughly a 7% increase from the previous year. Apparently, the tourism industry has a high growth potential of approximately 5% annually (UNWTO, 2011). The tourism industry can acquire opportunities in the market by utilizing the Internet (Gratzer et al, 2004),e.g., China is quickly turning into a source of tourists as more and more Chinese citizens

frequently travel abroad (Xiaoqiu Ma et al., 2003).The spread of information and communication technologies (ICTs) considerably affects the economy of a nation and the development of worldwide tourism development, particularly in less-developed countries(UNCTAD, 2004).In any case, a computerized role exists between tourist markets and goals inside and between nations, and this disparity leads to the so-called digital breakup (Minghetti and Buhalis, 2010; Shanker, 2008). Computerized devices emerge from this inequality that bars nations, particularly less-developed nations, from potential openings in the tourism market. In previous years, many of the important changes occurred in the areas of social structure and global economics because of the invention of ICTs, which play a vital role in economic growth and development and offer new opportunities for tourism at a global level. Products that are related to tourism, such as hotels, restaurants, travel agencies, or tour operators, could globally influence the tourism industry. Therefore, the strength of ICTs is very much real. ICTs turn the local market into a world market. By using ICTs, firms can survive crises and even improve their market position. In the tourism industry, the quantity of competitors increases day by day.

The real question is how can countries reframe ICT–tourism–terrorism policies under strategic guidelines to improve tourism by increasing ICTs and mitigating terrorism and to provide security to tourists across countries. This question is important in formulating robust policies that are in line with international calls for peaceful and secure tourism. Therefore, this study formulated the following subquestions to evaluate empirical data for conclusive findings:

i) Do ICTs support the war against terrorism at a global scale?

ii) To what extent do ICTs help increase inbound tourism?

iii) Will there be a crowding-out effect between military expenditures and tourism expenditures across countries?

iv) Will tourism income and arms support across countries increase because of smart technologies?

These questions require an in-depth study of the ICT–terrorism–tourism nexus to formulate policies for creating global peace and harmony in tourism-rich places via embodied smart technologies. This study has the following research objectives:

- To examine the dynamic linkages among ICTs, international terrorism, and tourism in a panel of selected countries
- To determine the extent of the effects of international terrorism on the tourism industry across countries
- To analyze the role of ICTs in the war against terrorism and in the development of tourism across nations

Rigorous empirical work is needed before sound policy initiatives can be proposed for identifying terrorist activities and promoting tourism via smart ICTs.

The study has a novel contribution to existing literature because previous studies largely endeavored to assess the tourism–terrorism nexus without evaluating the effects of ICTs. The role of ICTs in promoting the war against terrorism is obviously important because it can promote the agenda of tourism, which is to increase the safe and healthy visitation of tourists spots. Existing literature is mainly divided into three main themes:the role of terrorism on tourism (Asongu et al., 2019a,b;LanouarandGoaied, 2019;Karamelikli et al., 2019),the role of ICTs in promoting tourism (Buhalis, 2019; Alabau-Montoya and Ruiz-Molina, 2019),and the nexus between ICTs and terrorism (Scrivens and Conway, 2019; Bazarkina, 2019). The current study has a unique standing vis-à-vis earlier literature in that it amalgamates ICTs, terrorism, and

tourism in a panel setting and proposed several policy implications to promote tourism by increasing ICT utilization and military expenditure at tourist destinations.

2. Stylized Facts, Theoretical Underpinnings, and Literature Review

The definitions of terrorism are controversial because of the issues surrounding the identification of terrorist activities and because terrorism advances the judgment of the performing artists, which may reflect ideological or political biases (Gibbs, 1989). Terrorists are considered the normal actor in terrorism, and this is important to understand (Li and Schaub, 2004). They act violently togarnera response from the target population. The casualties or objects of terrorism attacks have minimal characteristic incentives to the terrorist group; however, terrorists speak to a bigger audience, whose response the terrorists look for (Crenshaw, 1981). Earlier studies connected the link between terrorism and tourism in different economic settings. For instance, Lutz and Lutz (2020) confirmed the negative effect of the September 11US terrorist attacks on tourism in the Caribbean. The study emphasized the need to mitigate negative terrorism externalities to increase foreign tourism in a region. Adeloye et al. (2019) discussed the strong linkages between domestic terrorism and tourism and argued that the risk of terrorism decreases the travel decisions of tourists, which negatively affects the tourists' selection of tourism spots where domestic violence is exacerbated. Lanouar and Goaied (2019) investigated the possible effects of terrorism and political violence on inbound tourism in Tunisia by using data from 2000 to 2016. The results showed that domestic terrorism has a severe negative effect on international tourists' activities, and its effect is far greater than that of international terrorism. Political shock also influences the decision of tourists to visit a particular country. There is a great need to defeat political violence and domestic terrorism by improving institutional quality, and it also depends on the amount of money spent on the war against terrorism in a country. A few other studies further established the link between terrorism and tourism in countries, such as Lebanon and Turkey (Bassil et al., 2019; Aktas, 2019), European countries, Europe and the United States (Stankova et al., 2019), OECD countries (Harb, 2019), a panel of 113 countries (Kollias and Papadamou, 2019), and a panel of 50 countries (NikšićRadić et al., 2019). These studies ostensibly concluded that the risk of terrorism decreases tourism activities across countries and necessitates the formulation of strong policies for galvanizing substantial expenditure on the war against terrorism for the sake of offering safe and secure tourist destinations to international tourists.

The role of tourism in economic growth is frequently discussed in literature, and previous studies confined their findings in three different dimensions. First is the tourism-led growth (TLG) hypothesis, which implies that tourism works as an engine of economic growth and increases economic activities by generating economic profits in the form of high tourism receipts. Therefore, the causality that moves from tourism to economic growth suggests that tourism is important for increasing economic growth, which supports the "growth hypothesis" across countries (Wu and Wu, 2019; Zhang and Chen, 2019; Škrinjarić, 2019). Second is the growth-led tourism (GLT) hypothesis, which implies that continued economic growth attracts international tourists to increase their visitation to different tourist destinations. The causality that moves from economic growth to tourism supports the "conservation hypothesis."Several studies support the stated argument that favors the GLT hypothesis (e.g., Shaheen et al., 2019; Nassani et al., 2019; Li et al.,2013;Jalil et al., 2013). Third is the bidirectional causality between tourism and economic growth, which states that both variables jointly move in the same two-way direction; therefore, the government needs concentrated efforts to promote both of them together

and obtain maximum revenue generation and employment promotion (Antonakakis et al., 2019;Anser et al., 2019). Katircioglu (2009a) performed a case study of the Turkish economy by using time series data from 1960 to 2006 and evaluated the causal relationship between national economic growth and tourism. The result confirmed neither the TLG nor GLT hypothesis (or feedback relationship), but it shows that a "non causal" relationship exists between both variables. The study emphasized the need to evaluate the tourism–growth nexus by using several socioeconomic and environmental factors to find robust inferences in a given country's context. Katircioglu (2009b) performed a case study of Cyprus to evaluate the tourism–trade–growth nexus and confirmed the GLT and trade-led tourism hypotheses in the country. The study argued that governments should manage the beauty of cultural heritage and tourist sites to attract foreign tourists and boost the country's economic growth. Katircioglu (2009c) further evaluated the TLG hypothesis in a case study of Malta and confirmed the feedback relationship between the two stated variables. There is a dire need to improve infrastructure that affects a country's economic growth, and this approach is likely to result in a tourism upsurge in a country. Katircioglu (2010) included higher educational growth in the nexus between tourism and economic growth in Northern Cyprus and confirmed the TLG and education-led growth hypotheses in that country. There is a greater need to promote higher education, which affects tourism expansion and continued economic growth. Khan et al. (2019) analyzed the key determinants of tourism in a panel of 21 countries from 2006 to 2016 and discovered that logistics play a key role in increasing tourism under financial and regulatory measures. Therefore, the viability of these stated factors leads to an increase in a country's economic growth. Qureshi et al. (2019) emphasized the need to develop sustainable tourism policies to attract more foreign tourists and ensure that they feel safe, happy, and healthy at tourism spots. This further translates into increased economic activities across countries. Anser et al. (2019) collected data from G7 countries from 1995 to 2015 to assess the causal relationship between sustainable tourism indicators and a country's economic growth. They confirmed the feedback relationship between tourism-derived income and economic growth, thus further verifying the tourism-associated emissions across countries.

The web is changing the requirements of consumers who are progressively becoming less trustworthy, take more continuous short-term vacations, and take less time in selecting and consuming a tourist item (Werthner & Ricci, 2004). Economic effects have a bearing on many obvious effects of tourism. Many of these effects are development related and usually encourage employment and other social influences by coordinating the activities and services for broad-based growth. Companies that are related to tourism indirectly play a crucial role in creating such types of effects. The already stressed involvement of substances (e.g., elements that actualize their central goal as a team with a similar kind of undertaking or incorporate different subjects) appears to be vital in the formation of significant value chains, notwithstanding the geographic scope and character of the business. This warrants the requirement for learning new technologies. ICTs offer the capacity to encourage enhanced focused performance via networking, bunching, and arranging partnerships. Additionally, it offers extravagant substances that are progressively required by buyers (Braun, 2008).

Berger et al. (2009) reported that several key features influence the success of a tourism e-business. These features include the exchange of information and social interaction among travelers, abundance of information on the Internet, stylish ideas of tourism products, attractive business-related product presentation, and enticing travel destinations. Tourism managers are those who focus on attaining a project's competitive advantages, holding new technologies, and

taking part in the planning process for technological application to identify new users and manage their developments (Moutinho and Vargas-Sanchez, 2018). Most of the tourist administrators prefer clients that arrive with similar goals. Special consideration should be given to consumer loyalty and complaint management because positive informal exchange is the aftereffect of happiness. The former should be always observed while keeping in mind the end goal of distinguishing issue zones and making vital adjustments to improve client satisfaction (Gursoy and McCleary, 2004). Therefore, these services should be continuously observed. The vision of this study is to exhibit special focus on the tourism industry by using information technology, which improves the cost- and price-competitiveness of the travel business worldwide. Table 1 shows recent literature on the ICT–terrorism–tourism nexus to address research problems across countries.

[Table 1 here]

The review of pertinent literature suggested the ideal way to achieve the stated research problems. The review of literature also concluded that ICT expansion is imperative for monitoring terrorist activities, the risk of terrorism, and its resulting negative effect on the tourism industry across countries. Long-term policies are warranted to address the given research gap(s) of the study. Among which, an increase in military expenditures would be deemed desirable in reducing international and domestic terrorism. Policy makers can also benefit from ICT expansion to determine the extremists' activities across countries.

3. Data Source and Methodology

The ICT variables employed in this study include i) computer, communication, and other services (% of commercial service exports); ii) Internet users (% of population); iii) secure Internet servers (per 1 million people); and iv) mobile cellular subscriptions (per 100 people). The study used the following factors for war against terrorism: i) military expenditures (% of GDP), ii) arms exports (USD), iii) arms imports (USD), and iv) armed forces personnel (total). Tourism development is represented by i) the number of tourist arrivals, ii) number of tourist departures, iii) tourism receipts in USD, and iv) tourism expenditures in USD. This study used some miscellaneous factors, such as i) per capita GDP in constant 2010 USD, trade openness in % of GDP, and FDI inflows in % of GDP. These variables were taken from the World Bank (2017) database. The countries are selected from the Global Terrorism Index (2016) published by The Institute for Economics and Peace (Sydney, Australia). Countries that are the least affected by terrorism and highly affected by terrorism have index valuesof0 and 10, respectively. The 28 sample countries selected from the Global Terrorism Index had index values of 5 to 10.Table 2 shows the details of the sample countries.

[Table 2 here]

The study benefits from the research inquiry of Asongu et al. (2019a), who showed the various drivers of tourism worldwide (the number of armed forces personnel, military expenditures, and law and order situation). These drivers are largely affected by domestic political instability, violence, and crime rate. Their study emphasized the need to create peace and harmony on tourist destinations to increase safety and healthy visitation across countries. Asongu et al. (2019b) further endorsed similar findings by using a large sample size of countries and argued that global insecurities lead to decreased tourist arrivals. They stressed the importance of providing safe tourist destinations with support. Harvey et al. (2019) discussed the

viability of international terrorism in different economic sectors that need fair and long-term policy implications for escalating global organizations. Dabić et al. (2017) developed the research framework for evaluating the terrorism–tourism nexus and found that the tourism industry is considerably affected by the number of terrorist cases in tourist destinations. Therefore, long-term policies for providing safe and healthy tourism are imperative to secure a country's economic growth.

The study discusses and links the "risk theory" and "innovation diffusion theory" separately and then integrates both theories in the backdrop of the ICT–terrorism–tourism nexus across countries. The "risk travel theory" framed by Roehl and Fasenmaier (1992) classified international tourists into three major groups: risk neutral, functional risk, and place risk. The risk-neutral group remains safe and secure in the tourist destination and does not intend to take any risk in the form of "functional risk" and "place risk."Hence, these tourists run off with an unsafe and insecure form of tourism in their subsequent visitations. The functional-risk group would be highly reluctant because of organizational failure regarding the effective promotion of tourism. Therefore, institutional failure leaves the promotion of tourism behind in attracting foreign tourists. The place-risk group perceives the risk related to the selection of tourism destinations, which affect the tourists' preference for a specific place.

Rogers and Williams (1983) developed the innovation diffusion theory, which determines the motives behind the use of new technologies, ideas, etc., by the customers so that economic activities can be comfortably performed. Dabphet et al. (2012) discussed the viability of innovation diffusion theory in the context of a stakeholder's selection of sustainable tourism destinations, and they argued that innovations would be helpful for conveying communication channels for valuing the sustainable tourism choice for healthy visitation. Under the domain of diffusion theory, the "theory of reasoned action" developed by Fishbein and Ajzen (1980) has seen more success in information system research. The "technology acceptance model" is the modified version of the "theory of reasoned action," which is widely used in understanding the intention of international tourists toward the use of a specific technology (Kim et al., 2008; Usoro et al., 2010; Tom Dieck and Jung, 2018).

The study connected both the "risk travel theory" and "innovation diffusion theory" to examine the possible relationships among ICTs, terrorism, and tourism across countries. On the basis of this discourse, the study used the following equations to analyze the dynamic linkages among terrorism, tourism, and ICTs in a panel setting:

Model1: The Effect of ICTs on the War against Terrorism (WAT)

$$\ln(WAT)_{it} = \beta_0 + \beta_1 \ln(CCS)_{it} + \beta_2 \ln(IU)_{it} + \beta_3 \ln(SIT)_{it} + \beta_4 \ln(MCS)_{it} + \beta_5 \ln(GDPPC)_{it} + \beta_6 \ln(TOP)_{it} + \beta_7 \ln(FDI)_{it} + \varepsilon_{it} \quad , \quad \text{(I)}$$

Model11: The Effect of ICTs on Tourism Development (TD)

$$\ln(TD)_{it} = \beta_0 + \beta_1 \ln(CCS)_{it} + \beta_2 \ln(IU)_{it} + \beta_3 \ln(SIT)_{it} + \beta_4 \ln(MCS)_{it} + \beta_5 \ln(GDPPC)_{it} + \beta_6 \ln(TOP)_{it} + \beta_7 \ln(FDI)_{it} + \varepsilon_{it} \quad , \quad \text{(II)}$$

Model III: The Effect of Military Actions on Inbound Tourism and Tourism Income

$$\ln(INBOUND) = \beta_0 + \beta_1 \ln(ME)_{it} + \beta_2 \ln(ARMSEXP)_{it} + \beta_3 \ln(ARMSIMPORT)_{it} + \beta_4 \ln(AFP)_{it} + \beta_5 \ln(GDPPC) + \beta_6 \ln(TOP)_{it} + \beta_7 \ln(FDI) + \varepsilon_{it} \quad \text{, (III)}$$

$$\ln(TINCOME) = \beta_0 + \beta_1 \ln(ME)_{it} + \beta_2 \ln(ARMSEXP)_{it} + \beta_3 \ln(ARMSIMPORT)_{it} + \beta_4 \ln(AFP)_{it} + \beta_5 \ln(GDPPC) + \beta_6 \ln(TOP)_{it} + \beta_7 \ln(FDI) + \varepsilon_{it} \quad \text{,(IV)}$$

Model IV: The Effect of Military Actions on ICTs

$$\ln(ICT) = \beta_0 + \beta_1 \ln(ME)_{it} + \beta_2 \ln(ARMSEXP)_{it} + \beta_3 \ln(ARMSIMPORT)_{it} + \beta_4 \ln(AFP)_{it} + \beta_5 \ln(GDPPC) + \beta_6 \ln(TOP)_{it} + \beta_7 \ln(FDI) + \varepsilon_{it} \quad \text{, (V)}$$

where WAT represents the war against terrorism; TD represents terrorism development; INBOUND represents number of tourist arrivals; TINCOME represents tourism income; ICT represents information and communication technologies; CCS represents computer, communication, and other services; IU represents Internet users; SIT represents secure Internet servers; MCS represents mobile cellular subscribers; ME represents military expenditures; ARMSEXP represents arms exports; ARMSIMPORT represents arms import; AFP represents armed forces personnel; GDPPC represents per capita GDP;TOP represents trade openness; FDI represents FDI inflows; "ln" represents the natural logarithm; "i" represents the number of cross-sections; and "t" represents the time period; and ε represents the error term.

Phillips and Hansen (1990) first introduced the fully modified ordinary least squares (FMOLS) regression. The purpose of the FMOLS regression is to estimate the cointegration regressions. The least square is converted in the serial correlation effects because of the FMOLS regression for the endogeneity in the regressors to prevent the outcome from being a cointegrating association. The general behavior is provided from this study, thus making it easy to examine the asymptotic behavior of FMOLS in models with full rank I(1) regressors.

The study also developed an asymptotic theory based on FMOLS for the purpose of implication. The "limit theory" for the Wald test includes the linear mixture of chi-squared variates, which is based on the FM estimator. This distribution is limited by the conventional chi-squared circulation, with degrees of opportunity equivalent to the limitation quantity. Therefore, in FM time series regressions, the valid asymptotic test is constructed using the critical conventional values. This model is used in experimental applications and in testing the causality in VAR estimation.

The study constructed three different indices by using principal component analysis to capture the relative weighted components for war against terrorism (represented by WAT), tourism demand (represented by TD), and information and communication technologies (represented by ICTs).WAT comprises four factors: war against terrorism, including military expenditures, arms exports, arms imports, and armed forces personnel.TD comprises tourism income, tourist arrivals, tourism expenditures, and tourist departures. ICT comprises computer and communication services, Internet users, secure Internet servers, and mobile cellular subscriptions. Table 3–5 shows the PCA matrix for three indices.

[Table 3 here]

Panel A in Table 3 shows the eigenvalues of four variables with different percentages of proportion. Factors 1 and 2 have eigenvalues of 2.192 witha54.18% proportional value and

1.0248 with a proportional variance of 25.62%, respectively. The eigenvalues of the third and fourth variables are 0.633with a percentage proportion of 15.83% and 0.149 with a percentage proportion of 3.74%, respectively. Panel B shows the eigenvectors of PC1 to PC4. PC1 is the most desirable factor that has a maximum additive value. Table 4 shows the PCS matrix for the TD model.

[Table 4 here]

Panel A in Table 4shows that the eigenvalues of the first, second, and third factors are 2.545, 0.301, and 0.153, respectively, and these values have proportional values of 84.84%, 10.06%, and 5.10%, respectively. Panel B consists of the eigenvectors of PC1 to PC3. PC2 is the most reliable factor because it shows the highest value among all PCs. Panel C shows the ordinary correlation between the variables. Table 5 shows the PCA matrix for the WAT index.

[Table 5 here]

Panel A in Table 5 shows that the eigenvalues of the first, second, and third factors are 1.708, 1.016, and 0.274, respectively, and these values have proportional values of 56.96%, 33.89%, and 9.14%, respectively. Panel B consists of the eigenvectors of PC1 to PC3. PC2 is the most reliable factor because it shows the highest value among all PCs. Panel C shows the ordinary correlation between the variables. Correlation shows the positive and strong relationships among the variables, except AFP and ME, which have a negative and weak correlation between them.

4. Results and Discussions

Table 6 shows the summary of the panel unit root tests for the ready reference, i.e., the Levin–Lin–Chu t-test, which is used to check the stationarity of variables at level form and at their first difference form. At the level, AFP, AIMP, CCS, FDI, MCS, ME, and TOP have significant values and were stationary at level form, whereas the remaining variables were difference stationary. The Im–Pesaran–Shin test showed that AFP, AIMP, FDI, and ME were stationary at level form, whereas the remaining variables are difference stationary, except IIUI, which became insignificant after the first difference. The ADF–Fisher chi-square test confirms that AFP, AIMP, CCS, FDI, and ME were stationary at level form, whereas the remaining variables were first difference stationary, except IIUI, which is nonstationary even at first difference. Finally, the PP–Fisher chi-square test confirmed that GDPPC, INBOUND, ITE, ITR, IIUI, and SIS were difference-stationary variables, whereas the remaining variables are level stationary. It is clear from the test that all variables are stationary at first difference, thus confirming the need to use the cointegrating equation by the panel FMOLS test to obtain reliable estimates. By contrast, to check for robustness, the study used the ARDL bounds testing approach for robust inferences.

[Table 6 here]

Table7 shows different panel cointegration estimates for the given models. The results of the Pedroni cointegration for the WAT-1 model showed that the model had a long-term and cointegrated relationship between the variables (as the rho panel [weighted statistic], PP-statistic panel [both at level and at weighted], and ADF-statistic panel [both at level and at weighted]) were significant at a 1% confidence interval. These results were further confirmed by the PP-

statistic and ADF-statistic groups, which clearly exhibited that both statistics fall in the 1% confidence interval; hence, they confided the cointegrated relationships among the variables.

The WAT-II results showed that the PP-statistic panel (weighted) and the ADF-statistic panel (both level and weighted form) had a long-term and cointegrated relationship that was exhibited at a 1% confidence interval. The result was confirmed by the PP-statistic and ADF-statistic groups ata1% confidence interval and cointegrated relationship between the variables.

In Model-I of TD, the Pedroni results showed that a long-term and cointegrated relationship was present between the variables according to the PP-statistic (at both dimensions) and ADF-statistic groups at a1% confidence interval. The PP-statistic group also showed the cointegrated relationship between the variables ata1% confidence interval and the long-term relationship between the variables.

[Table 7 here]

In Table 7, the TD-II model shows the long-term relationships and cointegrated variables as a v-statistics panel (at level), PP-statistic panel, and ADF-statistic panel (at both level and weighted form), which are significant ata1% confidence interval. This result was confirmed by the PP-statistic and ADF-statistic groups at a1% confidence interval. There was no significant value within and without the dimension factors; hence, it is clear that there was no cointegration between the variables in Model-3 and Model-4.The panel and group tests showed insignificant statistics, thus confirming that the models do not exhibit a long-term and cointegrated relationship between the variables. In Model-5, PP-statistic and ADF-statistic panels (both at level and weighted form) showed that there was a long-term and cointegrated relationship between the variables. These results were also confirmed by the PP-statistic and ADF-statistic groups, which confirmed the long-term relationships between the variables at a 1% confidence interval. The overall results confirmed that in the majority of cases, a long-term and cointegrated relationship existed between the different models. Hence, we move forward to evaluate the FMOLS estimator for parameter estimates. Table 8 shows the FMOLS estimates for robust inferences.

[Table 8 here]

The results show that the WAT index is influenced by ICT factors and growth-specific factors, such as computer and communication services, secure Internet servers, GDP per capita, and trade openness. This implies that ICTs factors provided massive information about terrorism and terrorism incidences and offered a workable solution to reduce terrorism intensity across countries. Jetter (2017) argued that in planning to test for a causal effect between media scope and resulting attacks, the specialist needs factual variety that can affect the media scope of al-Qaeda even though it is generally disconnected to their attack plans. The study revealed that when the quantity of passing from catastrophes (characteristic or mechanical) is higher anyplace in the planet, al-Qaeda's scope on US TV news is lower than anticipated. Therefore, it is difficult to locate a natural tale about how the event of disaster anyplace on the planet can influence the assault designs of al-Qaeda. The outcomes recommended that al-Qaeda's scope on CNN, NBC, CBS, or Fox News effectively empowers al-Qaeda attacks in the subsequent weeks. One moment of al-Qaeda's scope in a 30-minute news fragment caused approximately one assault in the forthcoming week, which is proportionate to 4.9 setbacks. Furthermore, the effect influenced the planning of attacks, in addition to further increasing the general number of al-Qaeda attacks.

These outcomes relayed the alert in the scope, with respect to al-Qaeda, because it may specifically empower psychological militant attacks.

The second model was related to the ICT index, which confirmed that armed forces personnel, arms imports, military expenditures, GDP per capita, and trade openness have a positive relationship with the ICT index. The result implied that military factors and growth-specific factors correspond with the ICT index; hence, it generalized the global importance of terrorism and ICTs. This study laid accentuation upon the ideas, the change techniques, and the adjustments to new technological advancements with regard to military tasks by featuring the new adjustment of forces, which then results in the renewal of political, social, and military procedures, in addition to their adjustments to the present destinations. This study aimed to conduct an exploratory inference of the effect of new innovative accomplishments in the field of military tasks (Pirnuta, 2011).

The results of the third model elaborated that there was a positive relationship between inbound tourism and GDP per capita (and trade openness), thus implying that higher inbound tourism is contingent on a country's economic performance and trade liberalization policies, which need to be clubbed together with appropriate economic policies. Previous studies confirmed the positivity between tourism and economic growth in either TLG and/or GLT hypotheses across countries (Chiu and Yeh, 2017;Shahzad et al., 2017;Isik et al.,2018).

The fourth model was related to the tourism development index, which showed that computer and communication services and mobile cellular subscription both had a positive effect on the tourism development index. This finding was further supported by a country's economic growth, which increases tourism demand across countries. The last model was related to tourism receipts (arms imports and a country's economic growth substantially improved tourism receipts in a panel of selected countries).Information technology plays a vital role in tourism industries. The use of ICTs has a broad scope, and it is frequently used in transport and lodging sectors (Jadhav and Shivaji, 2011).

The results were further checked using the pooled mean group (PMG) estimator to assess the robustness of the parameter estimates. Table 9 shows the PMG estimates for ready reference.

[Table 9 here]

The short-term results showed that computer and communication services and continued economic growth supported the vision of the WAT, and there was a greater need to secure Internet services for possible cybercrimes. In the long term, the findings moderately supported the short-term results and confirmed that computer services supported the WAT with regard to arms importation. The results concluded that ICT factors are considered helpful in supporting the WAT, which is important for a country's long-term growth (Popp and Yen, 2006;Chen et al., 2008;Gialampoukidiset al., 2016).

The relationship between military expenditures and inbound tourism was negative in the short term, thus showing that higher military expenditures decrease international tourist arrivals. This invokes concern for policy makers in attracting foreign tourists. A direct relationship was found between the increased number of armed forces personnel and inbound tourism, thus confirming the strong inclination of international tourists toward safe and healthy visitations (Seabra et al., 2020; Bassil et al., 2019;Corbet et al., 2019; AsonguandNwachukwu, 2019).

In the short-and long-term results, arms import tended to show a positive relationship with tourism receipts because higher arms import ostensibly led to an increased tendency to

upsurge tourism income across countries. The other chief factors, including a country's economic growth, trade openness, and FDI inflows, resulted in increased tourism income. These results are in line with the results of Kollias and Papadamou (2019) and Nasaani et al. (2017), who provoked the need for safe and healthy tourism under arms support.

Finally, in the short- and long-term results, there was clear evidence of a crowding-out effect between military expenditures and ICT expenditures because higher military expenditures reduced the expenses on ICT infrastructure. Therefore, there was a need to balance the "guns and butter proportion" in the policy scenario (Jurado-Sánchez and Jiménez-Martín, 2019).

The significant error correction term in all four models confirmed the long-term convergence in the given models with a range of 5.8%–20% (minimum to maximum). The Wald F-statistics showed that except for the INBOUND model, the remaining three models exhibited a long-term and cointegrated relationship between the variables.

Tables10a to 10e show the Granger causality estimates.

[Table 10a here]

The results show that WAT Granger caused CCS, but it has a bidirectional relationship with IUI, SIS, FDI, GDP, and TOP. The results confirmed that WAT substantially influenced ICT factors and growth-specific factors, which tended to show mutual coordination with growth-specific factors and Internet users. By contrast, WAT-led computer and communication services were confirmed in the given data set.

[Table 10b here]

Table 10b shows the bidirectional relationship between TD and ICT factors. By contrast, TD showed a bidirectional relationship with the growth-specific factors, except for trade openness. The results concluded that tourism demand increased with the ICT factors and growth-specific factors. This relationship was a two-way process, thus confirming that tourism demand influenced the ICT and growth-specific factors. Table 10c shows the Granger causality estimates for the INBOUND model.

[Table 10c here]

The results showed that inbound tourism has a bidirectional relationship with arms imports, per capita income, and FDI inflows, but it had no cause–effect relationship with military expenditures, trade openness, and armed forces personnel. These results confirmed that inbound tourism has a two-way causal relationship with arms imports, thus confirming the need for arms imports in providing safe and healthy tourism in the panel of selected countries. Table 10d shows the Granger causality estimates for tourism income.

[Table 10d here]

The results show that tourism receipts had a bidirectional relationship with military expenditures, armed forces personnel, and growth-specific factors, but it had a unidirectional causality running from tourism receipts to arms imports across countries. Table 10e shows the Granger causality estimates for ICT factors.

[Table 10e here]

The Granger causality estimates showed that arms imports and growth-specific factors had a bidirectional relationship with the ICT index, thus confirming that arms imports increased with the ICT factors and moved together in the long-term results. Therefore, effective knowledge-sharing policies are substantially required for militarization.

5. Conclusions

Terrorism is a global phenomenon. It draws the attention of the public, and media coverage plays a role in promoting terrorist agendas. The fast development of the tourism industry is a good indication for global business. Global economy relies considerably on the tourism industry. The ICT factors are significant influencers in tourism, travel, and other related industries. The integration of ICT in the tourism business is fundamental for attaining sustainable tourism endeavors. Tourism ventures can come to the forefront globally via solitary tap on the keypad because of the rise of portable PCs, web innovations, and so on. This study examined the linkages between ICTs, tourism industry, and international terrorism in a panel of 28 countries with higher-than-average incidences of terrorism. The results confirmed the importance of ICTs to the war on terrorism and the development of tourism in the 28-countrypanel. Secure Internet servers and computer and communication services improved the process of WAT, and there is an upsurge in armed forces personnel, arms imports, and military expenditures, which substantially improved ICT infrastructure. A country's GDP per capita and trade openness both positively influenced inbound tourism, whereas ICT factors and military factors increased tourism demand and tourism receipts, respectively. The results of the Granger causality indicated the bidirectional causality among i) the WAT index, ICT factors, and growth-specific factors; ii) tourism demand index and ICT factors, FDI, and per capita income; iii) inbound tourism and arms imports, per capita income, and FDI inflows; iv) tourism receipts and military expenditures, armed forces personnel, and growth-specific factors; and v) ICT index and arms imports and growth-specific factors. The unidirectional causality runs from i) the WAT index to computer and communication services, ii) trade openness to tourism demand index, iii) tourism receipts to arms imports, and iv) armed forces personnel to ICT index. Therefore, it is important to determine what type of terrorism and tourism policies are needed to i) provide a clear understanding of hazard examination and crisis management, ii) provide a proactive arrangement to make tourism less questionable, and iii) advance particular approaches to forestall terrorism against travelers and fight terrorism once it occurs.

It is ostensibly a formidable challenge to urge nations to set harsher punishments for those who abuse this technology, in addition to galvanizing worldwide engagement in fighting for this cause. It is important to make sure that national governments stay active in fighting terrorism and expanding the tourism industry. ICTs should considerably contribute in controlling terrorism and helping improve tourism industries, which plays a key role in uplifting global economies. The ICT–tourism–terrorism nexus has confined its importance in possible future studies to work on single countries (using both macro- and micro data) to obtain more robust inferences. Furthermore, the role of institutional quality in bringing harmony and peace in tourist destinations is imperative for smart tourism; therefore, this factor should be included to obtain diverse results. The utilization of smart applications, knowledge spillovers, marketing destinations, web-based applications, and smart web designing may further galvanize tourism to sway the tourists' decision about safe and healthy visitations. Therefore, these technologies may

further enhance the knowledgebase for reducing terrorism. Finally, R&D expenditures and financial development indicators maybe utilized to obtain diverse results in the frame of the ICT–tourism–terrorism nexus across countries.

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Appendix

Table –A: Kaiser-Guttman Principal Factors for WAT

Variables	Loadings F1	Communality	Uniqueness		
AFP	0.747831	0.559251	0.440749		
AIMP	0.752770	0.566663	0.433337		
ME	0.318625	0.101522	0.898478		
Factor	**Variance**	**Cumulative**	**Difference**	**Proportion**	**Cumulative**
F1	1.227436	1.227436	---	1	1
Total	1.227436	1.227436	---	1	---
Methods	**Model**	**Independence**	**Saturated**		
Discrepancy	0.011356	0.567695	0		
Parameters	6	3	6		
Degrees-of-freedom	0	3	---		

Table –B: Kaiser-Guttman Principal Factors for ICT

Variables	Unrotated Loadings		Communality	Uniqueness	
	F1	F2			
CCS	0.063026	0.369745	0.140683	0.859317	
IUI	0.968509	-0.098108	0.947635	0.052365	
MCS	0.908744	-0.165819	0.853312	0.146688	
SIS	0.794729	0.279846	0.709908	0.290092	
Factor	**Variance**	**Cumulative**	**Difference**	**Proportion**	**Cumulative**
F1	2.399392	2.399392	2.147246	0.904906	0.904906
F2	0.252146	2.651538	---	0.095094	1
Total	2.651538	2.651538	---	1	---
Methods	**Model**	**Independence**	**Saturated**		
Discrepancy	0.004758	1.921894	0.000000		
Parameters	11	4	10		
Degrees-of-freedom	-1	6	---		

Table –C: Kaiser-Guttman Principal Factors for ICT

Variables	Loadings F1	Communality	Uniqueness		
ITR	0.942428	0.888171	0.111829		
ITE	0.897249	0.805056	0.194944		
INBOUND	0.930128	0.865138	0.134862		
Factor	**Variance**	**Cumulative**	**Difference**	**Proportion**	**Cumulative**
F1	2.558365	2.558365	---	1	1
Total	2.558365	2.558365		1	
Methods	**Model**	**Independence**	**Saturated**		
Discrepancy	0.001067	2.275059	0		
Parameters	6	3	6		
Degrees-of-freedom	0	3	---		

Table 1: Current Literature on ICTs-Terrorism-Tourism Nexus

Authors	Country	Time Period	ICTs factors and Others	Results
Aldakhil et al. (2019)	South Asia	1975-2016	Telephone, internet, mobile penetration, R&D expenditures, etc	ICTs support country's economic activities through utilizing R&D expenditures that helpful to attract FDI inflows in the region.
Nizam et al. (2020)	Pakistan	1975-2017	Mobile, telephone subscription, human capital energy demand, etc.	Energy demand, trade, and human capital are the main determinants of ICTs penetration that achieve green development in a country.
Zhang and Danish (2019)	Asian countries	1990-2016	Mobile phone, internet users, human capital, economic growth, etc.	ICTs factors supported country's economic growth through human capital formation.
Dorcic et al. (2019)	Literature review	2012-2017	Mobile technologies, tourism, etc.	ICTs penetration helpful to international tourists in order to get information about 'tourists destination' through smart applications, which ultimately support tourism industry across countries.
Mahmood and Jetter (2020)	199 countries	1970-2014	Internet, radio, TV, news paper, terrorism, etc.	ICTs assist terrorists in the form of

Authors	Country	Time Period	ICTs factors and Others	Results
				coordinating among group members and spreading their voice, which latterly decreases through monitoring and arresting terrorists, thus exhibit the inverted U-shaped relationship between them.
Asgary and Ozdemir (2019)	Turkey	Questionnaire used	Weapons of mass destruction, terrorists attack, tourism industry, etc	Beside other factors, global risks associated with terrorists attack largely influenced *tourism* at global scale.
Adeola and Evans (2019)	Africa	1996-2017	Mobile, internet penetration, and tourism.	ICTs first decreases than increases *tourism* to exhibit the U-shaped relationship between them.
Seabra et al. (2020)	European countries	2002-2016	Terrorism and tourism	The risk of terrorism decreases international tourists count for visitation.
Andrianova (2020)	Russia	2016	Internet, financing, terrorism, etc	Financing terrorism through modern technologies hamper economic activities under digital economy.

Authors	Country	Time Period	ICTs factors and Others	Results
Saglam and Ampountolas (2020)	Turkey	2000-2016	Tourism and economic shocks	Structural shocks lead to decrease country's tourism demand.
Gok et al. (2020)	Turkey	2012-2016	Terrorism and equity market	Terrorists attack and risk of terrorism negatively affect equity market in a country.

Table 2: Sample of Countries

Countries	Region	Countries	Region	Countries	Region	Countries	Region
Iraq	Middle East	India	South Asia	Congo	Central Africa	Kenya	East Africa
Nigeria	West Africa	Turkey	Middle East	Sudan	North Africa	France	Western Europe
Syrian Arab Republic	Middle East	Libya	North Africa	Cameroon	Central Africa	Ethiopia	East Africa
Pakistan	South Asia	Egypt	Linked with Northeast Africa and the Middle East	Thailand	Southeast Asia	Mali	West Africa
Yemen	Middle East	Philippine	Southeast Asia	Bangladesh	South Asia	Saudi Arabia	Middle East
Lebanon	Middle East	Colombia	South America	United States	North America	United Kingdom	Europe
Burundi	East Africa	China	East Asia	Russian Federation	Connected with European, Asian, the Pacific and Arctic oceans.	Israel	Middle East

Table 3: PCA for ICT variables

Panel -A : Eigenvalues (Sum = 4, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	2.192	1.167	0.548	2.192	0.548
2	1.024	0.391	0.256	3.217	0.804
3	0.633	0.483	0.158	3.850	0.962
4	0.149	-----	0.037	4	1

Panel -B: Eigenvectors (loadings)

Variable	PC 1	PC 2	PC 3	PC 4
SIS	0.527	0.161	-0.731	0.400
MCS	0.545	-0.266	0.612	0.506
IUI	0.644	-0.050	0.035	-0.762
CCS	0.097	0.948	0.298	0.033

Table 4: PCA for TD Model

Panel -A: Eigenvalues (Sum = 3, Average = 1)					
Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	2.545	2.243	0.848	2.545	0.848
2	0.301	0.148	0.100	2.846	0.949
3	0.153	---	0.051	3	1
Panel -B: Eigenvectors (loadings)					
Variable	PC 1	PC 2	PC 3		
ITR	0.593	-0.160	-0.788		
ITE	0.575	-0.599	0.555		
INBOUND	0.562	0.783	0.264		

Table 5: PCA for WAT Index

Panel -A: Eigenvalues (Sum = 3, Average = 1)					
Number	Value	Difference	Proportion	Cumulative Value	Cumulative Proportion
1	1.708	0.692	0.569	1.708	0.569
2	1.016	0.742	0.338	2.725	0.908
3	0.274	---	0.091	3	1
Panel -B: Eigenvectors (loadings):					
Variable	PC 1	PC 2	PC 3		
AFP	0.683	-0.273	0.676		
AIMP	0.710	0.037	-0.702		
ME	0.166	0.961	0.220		

Table 6: Summary of Panel Unit Root Tests

Methods	AFP	AIMP	CCS	FDI	GDPPC	INBOUND	ITE	ITR	IUI	MCS	ME	SIS	TOP
Level													
LLC	Stationary	Stationary	Stationary	Stationary	No-stationary	No-stationary	No-stationary	No-stationary	No-stationary	Stationary	Stationary	Stationary	Stationary
IPS	Stationary	Stationary	-1.17584 (0.1198)	Stationary	No-stationary	No-stationary	No-stationary	No-stationary	No-stationary	No-stationary	Stationary	No-stationary	No-stationary
ADF	Stationary	Stationary	Stationary	Stationary	No-stationary	No-stationary	No-stationary	No-stationary	No-stationary	No-stationary	Stationary	No-stationary	No-stationary
PP	Stationary	Stationary	Stationary	Stationary	No-stationary	No-stationary	No-stationary	No-stationary	No-stationary	Stationary	Stationary	No-stationary	No-stationary
First Difference													
LLC	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	No-stationary	Stationary	Stationary	6.04972 (1.0000)	Stationary
IPS	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	No-stationary	Stationary	Stationary	1.30350 (0.9038)	Stationary
ADF	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	No-stationary	Stationary	Stationary	Stationary	Stationary
PP	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary	Stationary

Note: Small Bracket shows probability values.

Table 7: Pedroni Cointegration Estimates

Methods	**Model-I: WAT-I Series: WAT TOP GDPPC FDI**	**Model-I: WAT-II Series: WAT SIS MCS IUI CCS**	**Model - II: TD-I Series: TOP TD GDPPC FDI**	**Model - II: TD-II Series: TD SIS IUI MCS CCS**	**Model -III: INBOUND Series: GDPPC FDI TOP AFP AIMP ME INBOUND**	**Model - IV: Tourism Income Series: GDPPC FDI TOP AFP AIMP ME ITR**	**Model - V: ICT Series: ICT GDPPC FDI TOP AFP AIMP ME**
Panel v-Statistic	Й	Й	Й	√	Й	Й	Й
Panel rho-Statistic	Й	Й	Й	Й	Й	Й	Й
Panel PP-Statistic	√	√	√	√	Й	Й	√
Panel ADF-Statistic	√	√	√	√	Й	Й	√
Group rho-Statistic	Й	Й	Й	Й	Й	Й	Й
Group PP-Statistic	√	√	√	√	Й	Й	√
Group ADF-Statistic	√	√	Й	√	Й	Й	√

Note: √ shows significant estimate and having cointegrated relationship between the variables. Й shows insignificant estimates and having no cointegrated relationship between the variables.

Table 8: Panel FMOLS Estimates

Panel Fully Modified Least Squares (FMOLS)											
Models	**LOG(AFP)**	**LOG(AIMP)**	**LOG(CCS)**	**LOG(IUI)**	**LOG(MCS)**	**LOG(ME)**	**LOG(SIS)**	**LOG(GDPPC)**	**LOG(TOP)**	**LOG(FDI)**	**R^2**
Equation I: LOG(WAT)	_____	_____	0.005 (0.009)	-0.0005 (0.868)	-0.009 (0.000)	_____	0.004 (0.039)	0.974 (0.000)	0.060 (0.000)	0.001 (0.479)	0.9997
Diagnostic Results for Equation (I)				**Heteroskedasticity test**			**F-statistics: 1.144**		**Prob. value, F-statistics: 0.333**		
Equation II: LOG(ICT)	0.011 (0.016)	0.002 (0.051)	_____	_____	_____	0.037 (0.000)	_____	0.956 (0.000)	0.043 (0.000)	0.0008 (0.621)	0.999
Diagnostic Results for Equation (II)[a]				**Heteroskedasticity test**			**F-statistics: 0.642**		**Prob. value, F-statistics: 0.588**		
Equation IIILOG(INBOUND)	0.133 (0.120)	-0.007 (0.777)	_____	_____	_____	0.076 (0.470)	_____	0.812 (0.000)	0.291 (0.035)	-0.019 (0.524)	0.968
Diagnostic Results for Equation (III)[a]				**Heteroskedasticity test**			**F-statistics: 1.160**		**Prob. value, F-statistics: 0.324**		
Equation IV: LOG(TD)	_____	_____	0.207 (0.000)	0.048 (0.366)	0.124 (0.002)	_____	-0.0487 (0.187)	0.898 (0.000)	0.201 (0.155)	-0.040 (0.177)	0.969
Diagnostic Results for Equation (IV)				**Heteroskedasticity test**			**F-statistics: 1.743**		**Prob. value, F-statistics: 0.096**		
Equation V: LOG(ITR)	-0.024 (0.842)	0.085 (0.026)	_____	_____	_____	0.228 (0.141)	_____	1.325 (0.000)	0.045 (0.82)	-0.012 (0.781)	0.949
Variance Inflation Factors											
VIF for Equation 1: LOG(WAT)	_____	_____	1.067	9.348	7.816		3.352	4.565	1.278	1.194	
VIF for Equation 11: LOG(ICT)	1.041	1.055	_____	_____	_____	1.180	_____	1.206	1.164	1.182	
VIF for Equation 111: LOG(INBOUND)	0.007	1.055	_____	_____	_____	1.180	_____	1.206	1.164	1.182	
VIF for Equation IV: LOG(TD)	_____	_____	1.067	9.348	7.816	_____	3.352	4.565	1.278	1.194	
VIF for Equation V: LOG(ITR)	1.041	1.055	_____	_____	_____	1.180	_____	1.206	1.164	1.182	

Note: small bracket shows probability value.[a] excluding controlled variables.

Table 9: PMG Estimates

Variables	**Ln(WAT)$_t$**	**Ln(INBOUND)$_t$**	**Ln(TINCOME)$_t$**	**Ln(ICT)$_t$**
Δln(WAT)$_{t-1}$	-0.153*	-----	-----	-----
Δln(INBOUND)$_{t-1}$	-----	0.941*	-----	-----
Δln(TINCOME)$_{t-1}$	-----	-----	-0.062	-----
Δln(ICT)$_{t-1}$	-----	-----	-----	-0.023
Δln(CCS)$_t$	0.112**	-----	-----	-----
Δln(IU)$_t$	0.062	-----	-----	-----
Δln(SIS)$_t$	-0.259**	-----	-----	-----
Δln(SIS)$_{t-1}$	-0.087	-----	-----	-----
Δln(MCS)$_t$	-0.012	-----	-----	-----
Δln(ME)$_t$	-----	-0.259*	0.018	-0.348*
Δln(ME)$_{t-1}$	-----	-0.105	-----	-----
Δln(ARMSIMPORT)$_t$	-----	0.0002	0.037***	0.003
Δln(AFP)$_t$	-----	0.526*	0.432*	0.0008
Δln(GDPPC)$_t$	1.124*	0.814*	1.160*	0.532*
Δln(GDPPC)$_{t-1}$	-----	-----	-0.093	-----
Δln(TOP)$_t$	-0.842*	0.856*	0.669*	-0.261*
Δln(FDI)$_t$	0.019	-0.009	0.085**	-0.0001
Δln(FDI)$_{t-1}$	-----	-----	-----	0.00007
(CointEq)$_{t-1}$	-0.186*	-0.058*	-0.104*	-0.200*
Long-run Coefficients				
ln(CCS)	0.605**	-----	-----	-----
ln(IUI)	0.333	-----	-----	-----
ln(SIS)	-0.121	-----	-----	-----
ln(MCS)	-0.066	-----	-----	-----
ln(ME)	-----	-0.188	0.176	-0.369**
ln(ARMSIMPORT)	-----	0.310	0.359***	0.016
ln(AFP)	-----	0.526	0.558**	0.004
ln(GDPPC)	0.663	0.642*	0.910*	0.631*
ln(TOP)	-1.504**	0.679	0.677	0.087
ln(FDI)	0.102	-0.163	0.065	-0.031
Constant	17.875*	-4.979	-2.189	-2.121
ARDL Bounds Test				
Wald F-statistics	4.394**	3.368	4.425**	11.609*
Critical Values Bounds				
10% I(0) Bound	2.38	10% I(1) Bound	3.45	
5% I(0) Bound	2.69	5% I(1) Bound	3.63	
2.5% I(0) Bound	2.98	2.5% I(1) Bound	4.16	
1% I(0) Bound	3.31	1% I(1) Bound	4.63	

Note: *, **, and *** indicates 1%, 5% and 10% level of significance.

Table 10a: Granger Causality Estimates for WAT Model

Variables	CCS	WAT	IUI	MCS	SIS	FDI	GDP	TOP
CCS	N/A	#	→	↔	↔	#	#	#
WAT	→	N/A	↔	#	↔	↔	↔	↔
IUI	#	↔	N/A	↔	↔	↔	↔	↔
MCS	↔	#	↔	N/A	↔	↔	↔	↔
SIS	↔	↔	↔	↔	N/A	#	↔	→
FDI	#	↔	↔	↔	#	N/A	↔	#
GDP	→	↔	↔	↔	↔	↔	N/A	↔
TOP	→	↔	↔	↔	#	#	↔	N/A

Note: N/A shows not applicable, # shows no causality, → shows one way linkage (unidirectional), ↔ shows two way linage (bidirectional).

Table 10b: Granger Causality Estimates for Model -2: TD Model

Variables	IUI	CCS	MCS	SIS	GDPPC	FDI	TOP	TD
IUI	N/A	#	↔	↔	↔	↔	↔	↔
CCS	→	N/A	↔	↔	#	#	#	↔
MCS	↔	↔	N/A	↔	↔	↔	↔	↔
SIS	↔	↔	↔	N/A	↔	#	→	↔
GDPPC	↔	→	↔	↔	N/A	↔	↔	↔
FDI	↔	#	↔	#	↔	N/A	#	↔
TOP	↔	→	↔	#	↔	#	N/A	→
TD	↔	↔	↔	↔	↔	↔	#	N/A

Note: N/A shows not applicable, # shows no causality, → shows one way linkage (unidirectional), ↔ shows two way linage (bidirectional).

Table 10c: Granger causality estimates for Model -3: INBOUND

Variables	ME	INBOUND	AIMP	GDPPC	FDI	TOP	AFP
ME	N/A	#	→	#	↔	↔	↔
INBOUND	#	N/A	↔	↔	↔	#	#
AIMP	#	↔	N/A	↔	↔	#	↔
GDPPC	#	↔	↔	N/A	↔	↔	#
FDI	↔	↔	↔	↔	N/A	#	#
TOP	↔	#	#	↔	#	N/A	#
AFP	↔	#	↔	→	#	→	N/A

Note: N/A shows not applicable, # shows no causality, → shows one way linkage (unidirectional), ↔ shows two way linage (bidirectional).

Table 10d: Granger Causality Estimates for Tourism Income Model

Variables	ME	ITR	AIMP	AFP	GDPPC	TOP	FDI
ME	N/A	↔	→	↔	#	↔	↔
ITR	↔	N/A	→	↔	↔	↔	↔
AIMP	#	#	N/A	↔	↔	#	↔
AFP	↔	↔	↔	N/A	→	→	#
GDPPC	#	↔	↔	#	N/A	↔	↔
TOP	↔	↔	#	#	↔	N/A	#
FDI	↔	↔	↔	#	↔	#	N/A

Note: N/A shows not applicable, # shows no causality, → shows one way linkage (unidirectional), ↔ shows two way linage (bidirectional).

Table 10e: Granger Casualty Estimates for ICT Factors

Variables	AIMP	ME	AFP	GDPPC	FDI	TOP	ICT
AIMP	----------	#	↔	↔	↔	#	↔
ME	→	---------	↔	#	↔	↔	#
AFP	↔	↔	---------	#	#	→	→
GDPPC	↔	#	#	----------	↔	↔	↔
FDI	↔	↔	#	↔	---------	#	↔
TOP	#	↔	#	↔	#	----------	↔
ICT	↔	#	#	↔	↔	↔	---------

Note: N/A shows not applicable, # shows no causality, → shows one way linkage (unidirectional), ↔ shows two way linage (bidirectional).

Highlights

- To examine the relationship between ICTs, terrorism, and tourism in a panel of 28 countries.
- Global terrorism index is used to select the countries between 5 (moderate) and 10 (high terrorism incidence).
- Panel FMOLS estimator is used for robust inferences.
- Principal component matrix is used to construct war against terrorism, ICTs, and tourism index.
- The results confirmed that ICTs largely supported war against terrorism and tourism across countries.

Author's Contribution Section

Sheraz Ahmad Choudhary: Conceptualization, Writing-Reviewing and Editing. Muhammad Azhar Khan: Formal Analysis. Abdullah Zafar Sheikh: Writing-Reviewing and Editing. Mohd Khata Jabor: Investigation. Mohd Safarin bin Nordin: Software, Methodology. Abdelmohsen A. Nassani: Data Curation, Formal Analysis. Saad M. Alotaibi: Validation, Resources. Muhammad Moinuddin Qazi Abro: Visualization, Resources. Xuan Vinh Vo: Methodology, Data Curation. Khalid Zaman: Resources.